



On the future of the COMPAS-PDG Collaboration

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The COMPAS group

(IHEP, Protvino)

- Gathering and encoding the Particle Physics data since 1972
- Providing access to this data and the management of Particle Physics Data System (PPDS)
 - 'DG' - Data Guide
 - 'RD' - Reaction Data
 - 'CS' - Cross Sections
 - 'VOC' - Vocabulary
- System Phenomenology, creation of computational objects of knowledge

COMPAS contributions to PDG

- PDG Computing upgrade
 - ✓ Completion of Phase 1 (web – interfaces)
- Data exchange and improvements in the quality of data structure and data representation
 - ✓ Many improvements to the contents of RPP
 - ✓ Cross-Section assessed data; fits and plots (since 1996)
 - ✓ Particle Physics: One Hundred Years of Discoveries (1996)
 - ✓ Improvements in particle properties computer readable RPP output

Future plans (1)

- Restructuring and documenting of the code
- Improvements in maintainability of the system
 - Database-driven configuration
 - Possible switch of programming language
- New functionality
 - Search (including cross-particle searches for the data on the same observable)
 - RPP Index
 - Verifier's interface
 - Links to/from RPP (i.e. Link to RPP documents from SLAC)
- Parsing of particle properties and particle interactions data
(part of my thesis work, needs to be done before 2007)

Problem: inconsistent data description (1)

- Multiple meanings for the same terms
 - example: A^0 stands for both 'Axion' and 'Pseudoscalar Higgs boson'
- Multiple terms have the same meanings
 - example: σ and $f_0(600)$
- Different decay sections have different decay syntax
 - example:

$$\tau^- \rightarrow h^- h^- h^+ \geq \mathbf{1 \text{ neutrals}}$$

$$\rho(1700) \rightarrow \pi^+ \pi^- \mathbf{neutrals}$$

$$\eta \rightarrow \mathbf{neutral \text{ modes}}$$

$$\tau^- \rightarrow \pi^- K^+ \pi^- \mathbf{neut.} \nu_\tau$$

Problem: inconsistent data description (2)

- Decay texts are context-dependent
 - example: $\eta \rightarrow$ **other neutral modes**
- Decays are unsearchable
 - example: query for decays with 5 pions in the final state

$$\eta'(958) \rightarrow 5\pi \quad < \text{found}$$

$$D_s^+ \rightarrow 3\pi^+ 2\pi^- \quad < \text{not found}$$

Problem: cross-particle relations

- Coefficient values in cross-particle relations are updated manually; can easily lead to mistakes

- example:

$$\Gamma(\text{J}/\psi(1\text{S}) \text{ anything}) / \Gamma_{\text{total}}$$

\Downarrow

$$\Gamma_6 / \Gamma = (\Gamma_8 + \Gamma_9 + \Gamma_{10} + \mathbf{0.273} \Gamma_{67} + \mathbf{0.135} \Gamma_{68}) / \Gamma$$

where

$\mathbf{0.273}$ stands for $B(\chi_{c1} \rightarrow \gamma \text{ J}/\psi(1\text{S}))$

$\mathbf{0.135}$ stands for $B(\chi_{c2} \rightarrow \gamma \text{ J}/\psi(1\text{S}))$

To make the update dynamical we need to

- 1) link the coefficients to data
- 2) refit in chain from lower to higher mass

Future plans (2)

- Standardization of data description
- Metadata vocabulary
- Automated pre-production validation of the assessed RPP data

Conclusions, needs and expectations

- Completion of most of our collaboration plans require improvements in RPP, work on this improvements should get started as soon as possible.
- Significant part of improvements needs to be done before 2007. After implementing these improvements it will become easier for COMPAS to efficiently contribute to RPP.
- Assistance from PDG side is needed for making this improvements.